

Early Childhood Research Institute on
Measuring Growth and Development:
A Decision-Making Process

Mary McEvoy

Ruth Kaminski

Jeff Priest

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Web address: ici2.umn.edu/ecri

ECRI-MGD Research Team

- University of Kansas
 - Judith Carta
 - Charles Greenwood
 - Jane Atwater
 - Dale Walker
 - Deborah Linebarger
 - Gayle Luze
- University of Oregon
 - Ruth Kaminski
 - Roland Good
 - Karen Rush
 - Sylvia Smith
- University of Minnesota
 - Scott McConnell
 - Mary McEvoy
 - Carol Leitschuh
 - Jongho Shin
 - Jeff Priest

Today's Presentation

- ECRI Overview: Rationale, Goals, Components, Research and Development Model
- Decision-Making Model: What We've Learned from Applying DIBELS
- *Individual Growth and Development Indicators* (IGDIs): Measures of Young Children Across Multiple Domains

Rationale

- Increasing demand for accountability
- Need for a comprehensive system that:
 - describes children's growth and development over time
 - provides a model in which decisions may be made for designing, informing and evaluating interventions
 - can be used for individuals and groups of children
 - allows families, early childhood and elementary educators to identify areas in need of change to optimize child outcome

Goal

Produce a comprehensive performance measurement system for early intervention, preschool, and primary-grade programs serving children with disabilities from birth to eight years of age, and their families.

Research &
Development Model

1. Identify *general outcomes*
2. Develop and pilot potential *IGDIs*
3. Conduct studies to establish technical adequacy of IGDIs, reliability, validity, sensitivity, utility
4. Select the best IGDI for use
- ▼ 5. Field test IGDIs within *Decision-Making Model*

Identifying General Outcomes for Young Children

Procedures

- Age-based review and development
- Across-age comparison and synthesis
- National survey of parents of young children with and without disabilities, and professionals in early childhood and early elementary education and special education

Important General Growth Outcomes - I

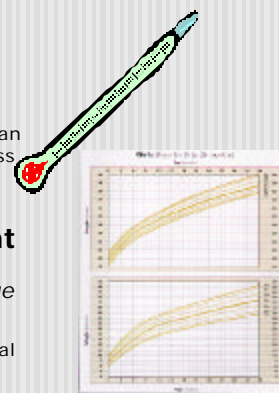
- **Expressive Communication**
 - Child uses gestures, sounds, words, and sentences to convey wants and needs or to express meaning to others.
- **Early Literacy**
 - Child understands and uses concepts related to early literacy skills.
- **Social Interaction**
 - Child interacts with peers and adults, maintaining social interactions and participating socially in home, school, and community settings.

Important General Growth Outcomes - II

- **Movement**
 - Child moves in a fluent and coordinated manner to play and participate in home, school, and community settings.
 - Child manipulates toys, materials, and objects in a fluent and coordinated manner to play and participate in home, school, and community settings.
- **Adaptive**
 - Child engaged in a range of basic self-help skills, including but not limited to skills in dressing, eating, toileting/hygiene, and safety/identification.

IGDI

- **Individual** (can be aggregated across groups of children)
- **Growth and Development** (developmental status and change over time)
- **Indicator** (vital sign)

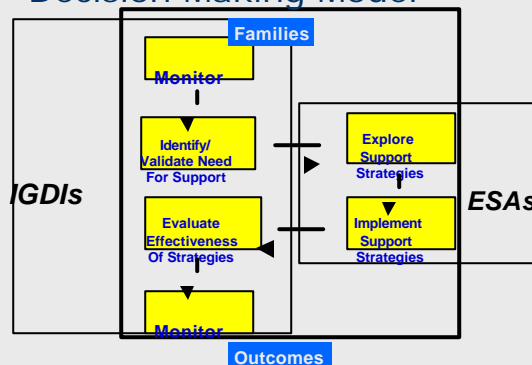


Develop, Research, and Select IGDI's

What makes a good IGDI?


- Measures critical skills related to important outcomes for children
- Efficient and economical
- Standardized/Replicable
- Repeatable over time with many alternate forms
- Technically adequate (i.e., evidence of reliability and validity)
- Sensitive to growth over time and sensitive to the effects of intervention

Decision Making Model



DIBELS within a Decision-Making Model

- Dynamic Indicators of Basic Early Literacy Skills (DIBELS)
 - Onset Recognition Fluency
 - Phoneme Segmentation Fluency
 - Nonsense Word Fluency



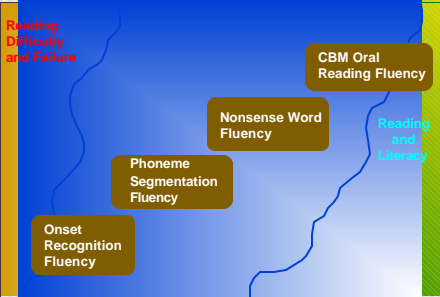
Kindergarten Benchmark Goals

- Established Initial Sounds (Onset) Phonological Awareness by Winter of Kindergarten
 - if you hit 25 - 35 correct on Onset Recognition Fluency (OnRF) in winter of K, the odds are in your favor to reach 35 to 45 correct on Phoneme Segmentation Fluency (PSF) in spring of K.
- Established Phonological Awareness by Spring of Kindergarten
 - if you hit 35 to 45 correct on Phoneme Segmentation Fluency (PSF) in spring of K/fall of first grade, the odds are in your favor to hit 40 or more correct on Nonsense Word Fluency (NWF) in winter of first grade.

First Grade Benchmark Goals

- Established Alphabetic Principle by Winter of First Grade
 - if you hit 40 or more correct on Nonsense Word Fluency (NWF) in winter of first grade, the odds are in your favor to hit 40 or more correct on Curriculum-Based Measurement (CBM) Reading in spring of first grade.
- Established Reader by Spring of First Grade
 - if you hit 40 or more correct on Curriculum-Based Measurement (CBM) Reading in spring of first grade you are an established reader.


DIBELS Steppingstones to Literacy



Using DIBELS: Three levels of assessment

- **Benchmarking**
 - Assess all children at critical times (e.g., Fall, Winter, Spring)
 - How is the program (e.g., school, curriculum, instruction) doing overall?
 - Which children may need additional support to achieve outcomes?
- **Strategic Monitoring**
 - Assess at risk children more frequently (e.g., monthly)
 - Is current program sufficient to keep progress on track or are additional supports/intervention needed?
- **Continuous or Intensive Care Monitoring**
 - Assess students needing more intensive, effective intervention weekly
 - Are instructional supports/strategies effective or is a change in intervention needed?

Using DIBELS in a model: Decision making steps

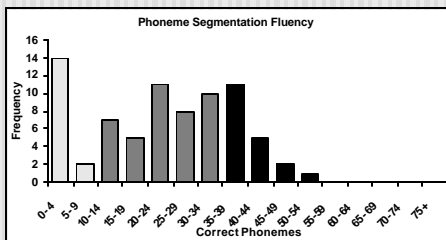


Monitor Growth and Development

- 1. Identify Need for Support
- 2. Validate Need for Support
- 3. Explore Support Strategies
- 4. Implement Support Strategies
- 5. Evaluate Effectiveness of Support.

Monitor Growth and Development

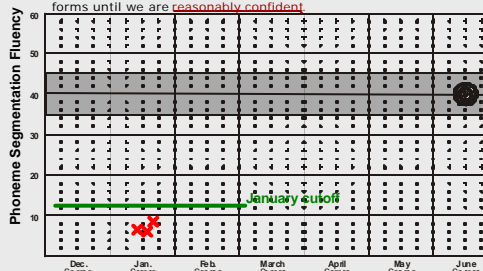
Identify Need for Support: School Level



■ In this school, 21% of children are potentially at risk for poor reading outcomes.

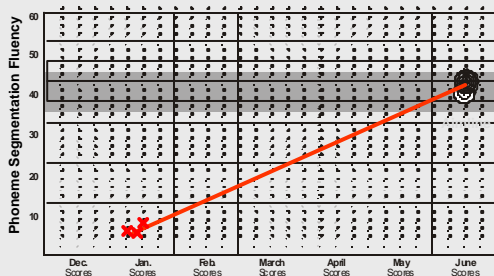
Validate Need for Support

- Are we **reasonably sure** they need instructional support?
- If there is any concern about the accuracy of scores for an individual student, performance should be verified by retesting with alternate forms until we are **reasonably confident**.



Exploring Support - What Goal?

The **aimline** provides a roadmap showing where you are, where you want to get to, and the rate at which you must progress in order to get there on time.



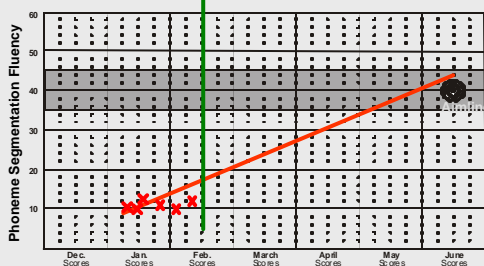
Exploring Support – What Strategies

- ESAs
 - Program Features Assessment
 - Ecobehavioral Assessment
 - Activity-Based Assessment



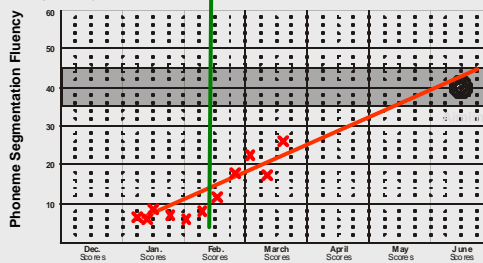
Evaluating Support - Is it Working?

Whoops! The intervention was not effective in teaching phonological awareness to this child! The child is getting off their aimline. Time to make a change!



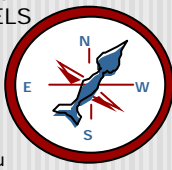
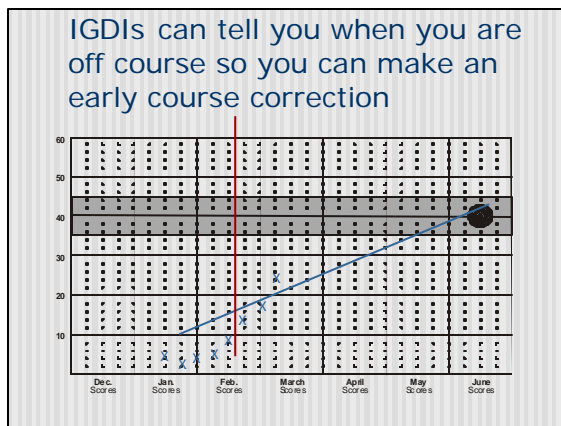
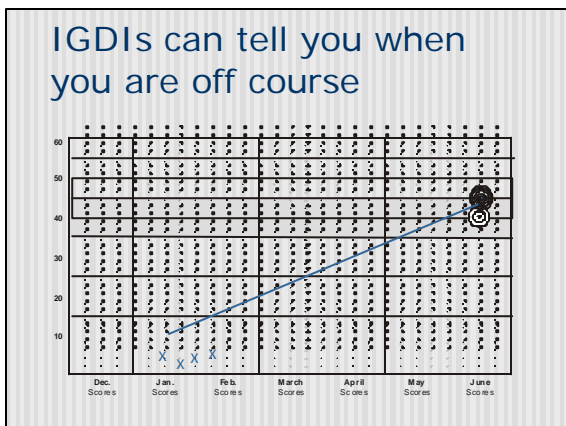
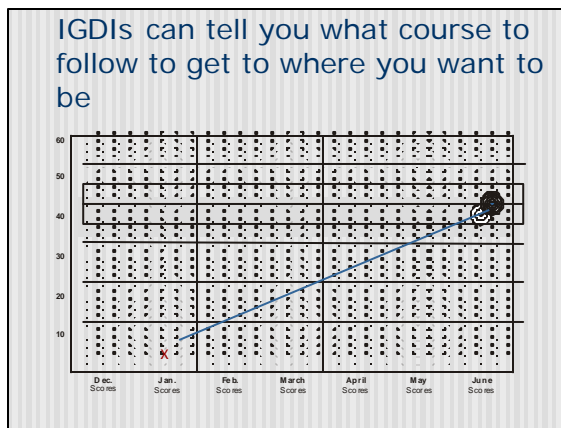
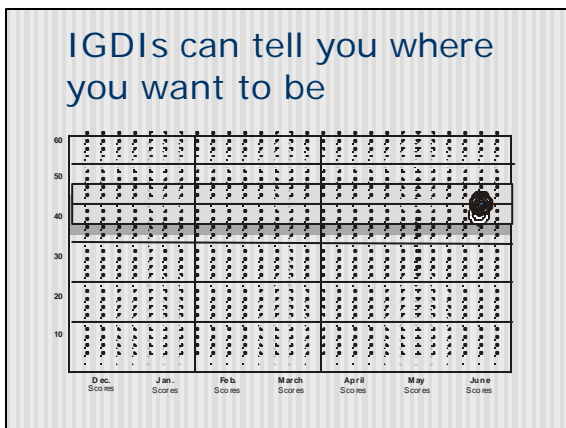
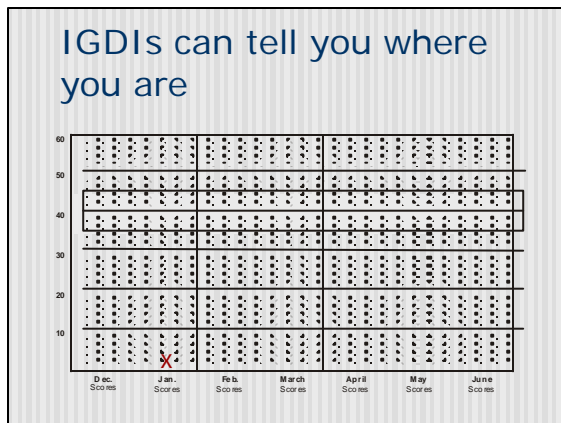
Evaluating Support - Is it Working Now?

The Modified Intervention is effective in teaching phonological awareness to this child! The child is on their aimline.



DIBELS and IGDIs are the GPS of Educators

- Throughout the preschool and early elementary years, DIBELS and IGDIs tell you:
 - Where you are.
 - Where you want to be.
 - What course to follow to get there.
 - When you are off course so you can make an early course correction.

Steps for Developing IGDIs - I

- Identify key elements for each outcome within each age group
- Select criterion measure for each outcome and age group
- Develop data collection formats
 - Pilot-test across age range
 - Assess interest, production of desired behaviors, feasibility

Steps for Developing IGDIs - II

- Identify measures
 - Apply multiple scoring formats for each data collection format
 - Test for distribution across subjects, differences across age, correlations with criterion measures
- Assess technical features
- Select the "racehorse"
- Conduct normative studies

IGDIs by Age Group

■ Infants/Toddlers

- Expressing Meaning
- Social Interaction
- Movement



■ Preschoolers

- Expressing Meaning
- Early Literacy
- Social Interaction



■ Early Elementary Students

- Expressing Meaning
- Early Literacy
- Social Interaction



Expressing Meaning (EM): Infants/Toddler (B-3) Format

■ Naturalistic Observation Situations (NOS)

- Loosely structured observations of a child's communication during 6-minute play interactions with parent or other familiar adult
- Two alternate forms using Fisher-Price® House or Barn

EM: Infant/Toddler Measure

- Rate per minute of **total communication**
 - social attention
 - gestures
 - vocalizations
 - single words
 - multi-word utterances
- Weighted total communication
 - single words = 2
 - multi-word utterances = 3

EM: Infant/Toddler Participants and Settings

Participants

- 50 infants/toddlers, between 3 and 34 months of age
 - 6 received special education services

Settings

- University-affiliated child care program
- Urban centers for children of teenage mothers
- Urban and suburban child care programs

EM: Infant/Toddler Results

- **Alternate forms** reliability was high ($r = .72$)
- Relationships with **comparison measures** (Preschool Language Scale-3 and Caregiver Communication Measure) were strong ($r_s = .56 - .62, p < .01$)
- **Sensitive to growth** over time (mean slope of .75 communicative responses per minute per month) and individual differences (e.g., disability status)
- **Easy** and **Practical** to administer

EM: Sensitivity to Intervention (Infant/Toddler)

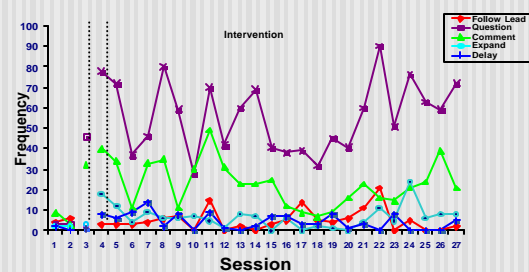
Kareem

- **Concern:**
 - low Total Communication IGDI baseline rate of growth
- **Validation:**
 - scored in 39th percentile on standardized, norm-referenced language test
 - Teacher and parent report low functional communication skills and frequent incidence of swearing

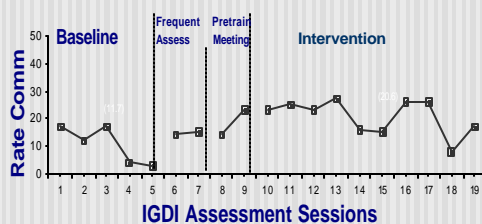
Infant/Toddler Intervention: Kareem

- **Exploring Solutions Assessment:**
 - Missed opportunities for language promotion, low levels of teacher interaction
 - Caregiver/parent respond to negative verbal behavior
- **Implement Solution:**
 - Modified Milieu Teaching
- **Validate Solution:**
 - Average communication rate doubles from baseline level, and caregiver/parent reports more frequent use of multi-word utterances

Fidelity of Communication Intervention: Kareem



Change in Growth: Kareem



EM: Preschoolers (3 – 5)

Picture Naming

Format

- Present child with photos of common "objects," one at a time, and ask her/him to name pictures as fast as possible
- Stop after 1 minute



Measure

- Total number of pictures named correctly in 1 minute

EM: Preschool Participants and Settings

Participants

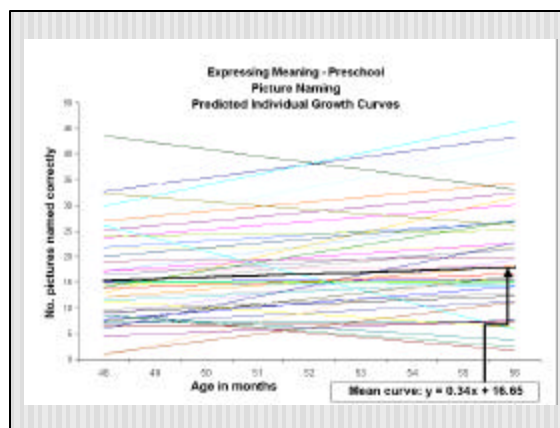
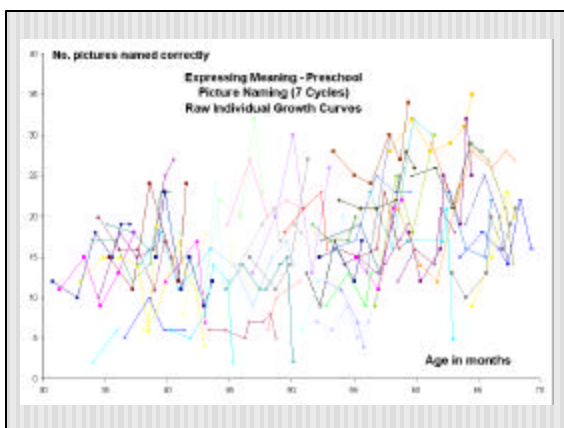
- 101 preschoolers, between 31 and 65 months of age at initial assessment
 - 16 received special education services
 - 15 children spoke language other than English at home

Settings

- University-affiliated child care program
- Head Start
- Segregated ECSE classrooms

EM: Preschool Results

- **Alternate forms** reliability was high ($\alpha_s = .44 - .78, p < .01$)
- Relationships with **comparison measures** (Peabody Picture Vocabulary Test-III, Preschool Language Scale-3) were strong ($\alpha_s = .47 - .79, p < .001$)
- **Sensitive to growth** over time (mean slope of .34 correctly named pictures per minute per month) and individual differences (e.g., disability status)
- **Easy** and **practical** to administer



EM: Early Elementary (5 – 8)

Word Meaning Fluency

- **Format:** Examiner orally presents word and asks child to tell a sentence using the word.

- "Listen to me use this word in a sentence.
Jump. I like to jump rope. Your turn to use a word in a sentence. Pool."

| Probe 1 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | Score | |
|----------|---|---|---|---|---|---|---|---|---|----|----|----|----|----|----|----|----|----|----|----|----|----|-------|-----|
| pool | | | | | | | | | | | | | | | | | | | | | | | | 6/5 |
| tried | | | | | | | | | | | | | | | | | | | | | | | | 6/5 |
| worry | | | | | | | | | | | | | | | | | | | | | | | | 6/5 |
| happened | | | | | | | | | | | | | | | | | | | | | | | | 6/5 |

EM: Early Elementary Participants and Settings

Participants

- 380 children in kindergarten, first grade, and second grade

Settings

- Elementary schools in metropolitan, suburban, and rural areas

EM: Early Elementary Results

- **Alternate forms** reliability was high ($r_s = .54 - .59$)
- Relationships with **comparison measures** (Peabody Picture Vocabulary Test-III, Test of Language Development) were moderate ($r_s = .28 - .41$)
- **Sensitive to growth** over time (mean slope of 3.12 words per minute per month)
- **Easy** and **practical** to administer

Social Interaction (SI): Infants/Toddlers

Format

- Loosely structured 6-minute play situation with a familiar adult and two peers
- Alternate forms:
 - Window House (square tunnel with windows)
 - Play Kitchen
 - Tub of Toys

SI: Infant/Toddler Measures

- **Behaviors**
 - Social turns (with adult and peers)
 - active interaction or exchange between the child and play partners
 - Social attention (with adult and peers)
 - sustained gaze directed toward partner's eyes
 - Negative
 - undesirable behaviors, such as hitting, yelling, pushing, directed to a play partner
- **Measures**
 - Total social interaction (social turns + social attention)
 - frequency and rate per minute
 - Total negative behavior

SI: Infant/Toddler Participants and Setting

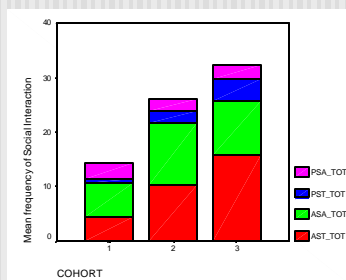
Participants

- 34 children, between 6 and 40 months of age
 - 2 children with disabilities

Setting

- Community-based child care center
- Urban centers for children of teenage mothers

SI: Infant/Toddler Results - I



Cohorts:
 1=0-12 months
 2=13-24 months
 3=25+ months
 PSA=Peer Social Attention
 PST=Peer Social Turn
 ASA=Adult Social Attention
 AST=Adult Social Turn

SI: Preschool Formats and Measures - I

Picture Prompt

Format

- "Tell me all the stuff you and your friend can do here together."



Measures

- Total number of novel and novel/interactive play ideas

SI: Preschool Formats and Measures - II

Social Play

Formats

- Silly Faces Game
- Puzzles

Measures

- Total duration of joint play (total amount of time in which two children are simultaneously looking at or playing with the same object, person, or game)
- Total number of social turns (occurs any time a child engages in purposeful verbal, physical, or nonverbal activity which elicits a response from the peer within three seconds)

SI: Preschool Participants and Setting

Participants

- 30 children, between 36 and 69 months of age
 - None received special education services
 - All spoke English at home

Setting

- Private day care program

SI: Preschool Results

- Relationships with **comparison measures** (Observer Impressions Scale and teachers' rankings of children's social interaction skills) were low to moderate ($r_s = .05 - .53$)
- Relationships with **chronological age** were moderate ($r_s = .36 - .58$), indicating sensitivity to growth over time
- Relatively **easy** and **practical** to administer

SI: Early Elementary

Cooperative Social Play Activity

- Analogue setting: 3 students are given one of the following materials and told to work together to accomplish task
 - Lego Castle
 - Puzzle Shapes
 - Story Building
- Duration: 10 minutes

SI: Early Elementary Measure

Behaviors

- **Active Cooperation:** initiates, supports, encourages, leads group to complete project
- **Passive Cooperation:** listens, responds, cooperates with group process
- **Active Non-Cooperation:** argues, is aggressive, criticizes others
- **Passive Non-Cooperation:** doesn't share materials, doesn't participate with group, solitary play

Measure

- Total number of 10-second intervals of each behavior

Planned Study for Early Elementary SI

Participants

- 30 children per grade level (K,1,2,3)

Research questions

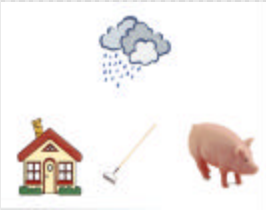
- Alternate forms reliability
- Criterion related validity (Social Skills Rating System, observations)
- Sensitivity to growth

Early Literacy (EL): Preschool Formats & Measures - I

Alliteration

Format

- "Point to the picture that starts with the same sound as r – rain."



Measure


- Total number of correct pictures

Early Literacy (EL): Preschool Formats & Measures - II

Rhyming

Format

- "Point to the picture that sounds the same as bees."



Measure

- Total number of correct pictures

EL: Preschool Participants and Setting

Participants

- 39 children, between 35 and 69 months of age
 - None receiving special education services
 - All spoke English at home

Setting

- Private day care program

EL: Preschool Results

- Relationships with **comparison measures** (Peabody Picture Vocabulary Test-III, Concepts About Print, Test of Phonological Awareness – for children 54 months of age and older, and Letter Naming task) were strong ($r_s = .54 - .75, p < .01$)
- Relationships with **chronological age** were strong ($r_s = .44 - .61, p < .01$), indicating sensitivity to growth over time
- **Easy** and **Practical** to administer

<http://idea.uoregon.edu/~dibels/>

EL: Early Elementary

- **Dynamic Indicators of Basic Early Literacy Skills (DIBELS)**

| Formats | Measures |
|--------------------------------|---|
| ■ Onset Recognition Fluency | ■ No. correct onset sounds |
| ■ Phoneme Segmentation Fluency | ■ No. correct phonemes |
| ■ Nonsense Word Fluency | ■ No. correct letter-sound correspondence |
| ■ Letter Name Fluency | ■ No. correct letters |

Movement: Infants/Toddlers

Prospective Formats

- Structured situations to elicit movement
- Naturalistic observation of movement in classrooms

Prospective Measures

- Transition in position: prone, supine, sit, stand
- Locomotion: crawl, cruise, walk, run, jump
- Reception: catch object
- Propulsion: roll object, throw, kick, strike

Next Steps

- Develop and test IGDIs in motor and adaptive domains
- Examine IGD I linkages across age groups
- Increase normative data, including more diverse samples of children
- Study sensitivity to effects of intervention across IGDIs
- Disseminate, disseminate, disseminate

Implications

- Increase knowledge of young children's growth toward important developmental outcomes
- Increase families' understanding of their children's development, and increase professionals' abilities to share developmental information with families
- Increase likelihood of intervening in a timely way on behalf of children whose developmental trajectories may not meet, or are not meeting, expectations
- Increase professionals' options for evaluating effects of intervention